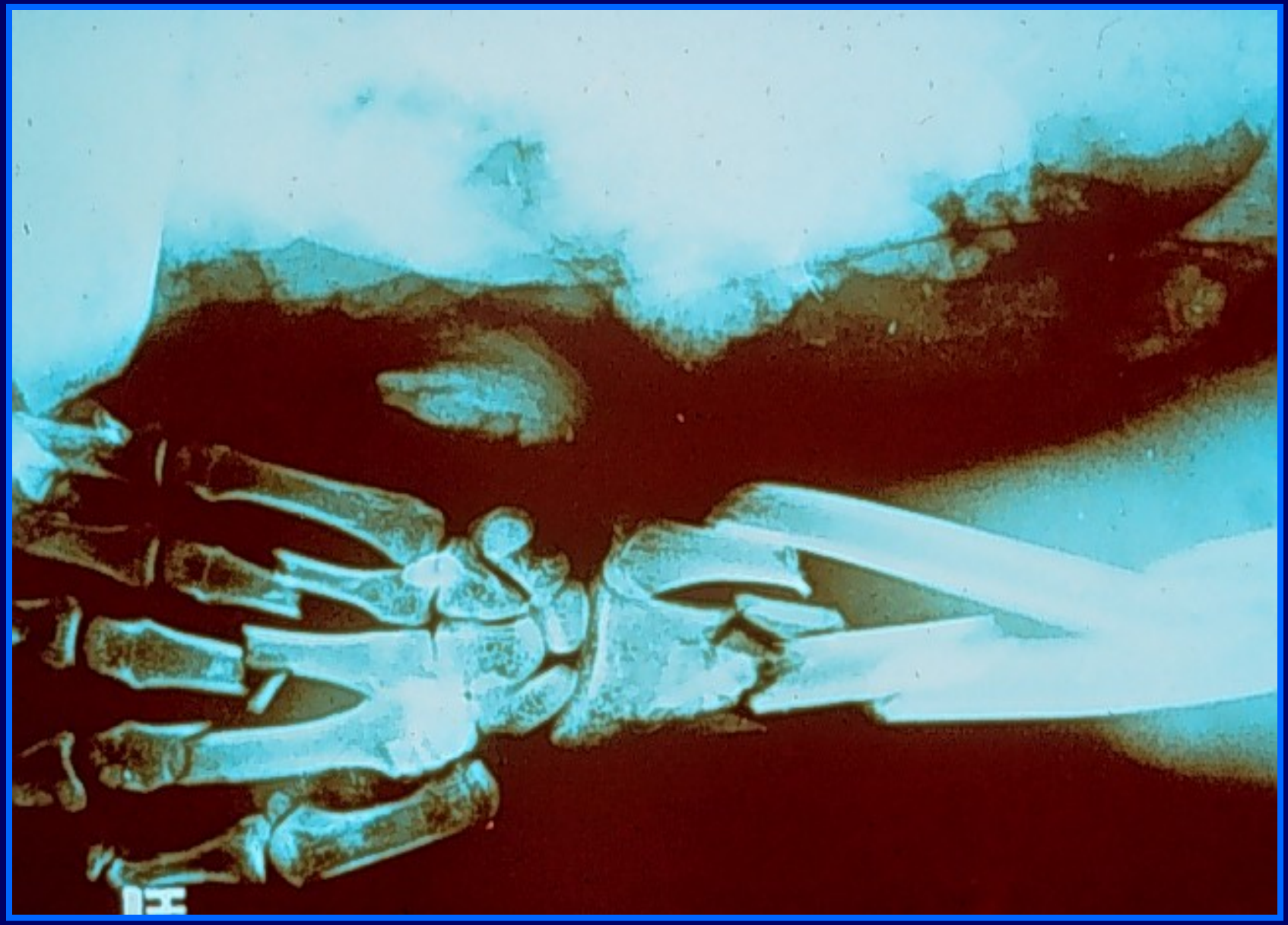
Control Handling Injuries

Identification of the Pilot at the time of the crash

- Importance
  - Reconstruction
  - Legal aspects
  - Assessment of incapacitation
- Methods
  - Control handling injuries
    - Radiography is essential, preferably two views of all hands and feet
  - Voice and data recorders
  - Autopilot settings/engagement

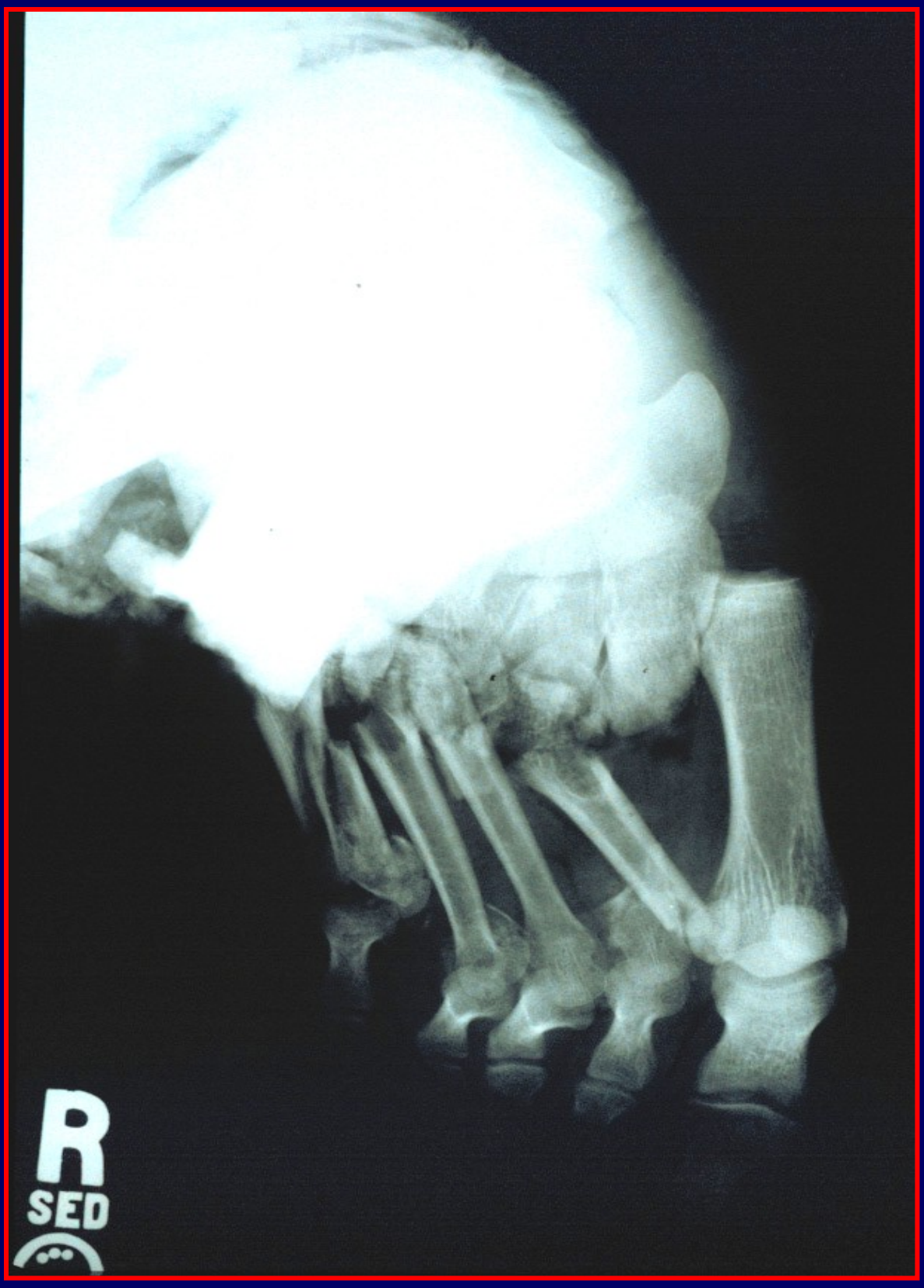
Control handling injuries of the hands

- Inside of the hands and fingers, especially the first web space
  - Flail injuries occur almost exclusively on the dorsal aspects of extremities
- Fracture dislocation or severing of the thumb
- Dislocation or compression fractures of the wrist
- Flexion fracture of the distal 1/3 of the forearm with penetration of the skin
- Penetration of the_body by fragments of the controls



Control handling injuries of the feet

- Stripe-shaped hematomas or contusions
- Lacerations of the lateral feet where pedal rims are elevated
- Transverse metatarsal fractures
- Comminuted tarsal fractures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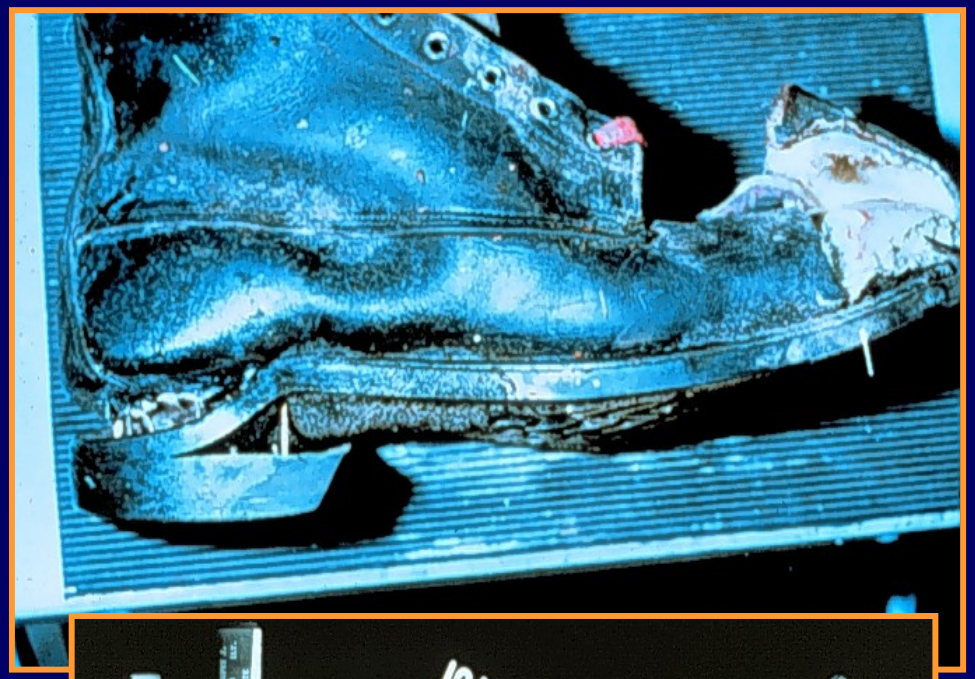
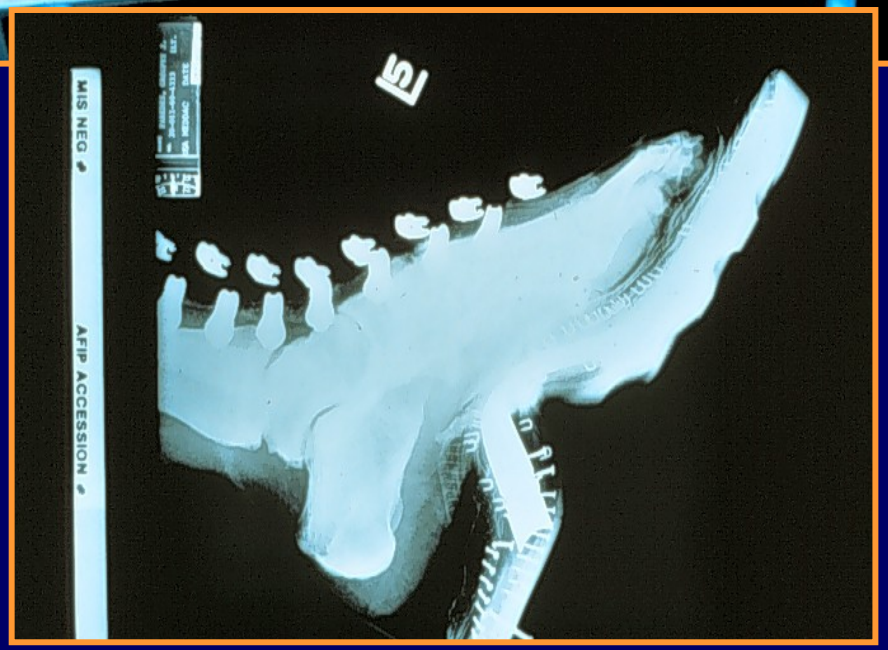
Clothing

- Clothing transfers to the controls
- Pedal marks
- Glove dye transfers




MIS NEG #
AFIP ACCESSION #

Reliability and interpretation

- Campman, 2000

4-Cell Diagnostic Matrix

	Pilot	Passenger
C.I.	29	42
No C.I.	13	16

Sensitivity and Specificity

Sensitivity = TP/(TP + FN)

= 29/(29 + 13) = 69%

Specificity = TN/(TN + FP)

= 16/(16 + 42) = 28%

	Pilot	Passenger
C.I.	29	42
No C.I.	13	16

Positive and Negative Predictive Values

Positive Predictive Value - the probability that having a control injury represents a pilot

PV(+) = TP/(TP+FP) = 41%

Negative Predictive Value - the probability that not having a control injury represents a PAX

PV(-) =TN/(TN+FN) = 45%

Increasing the Sensitivity and Specificity

- **Include distal radius/ulna and distal tibia/fibula fractures, ankle/wrist dislocations only if fracture/dislocation of bones of the hand and foot and/or lacerations of volar surfaces are present.**
- **Include those with CI of more than one extremity**
- **Beware of those with only lower extremity CI**

Confounding factors

- Pilot posture
- Tonicity
- Crew tasks and coordination
- Other manual tasks
- Nonspecific force application
- Postmortem artifact

Reliability and interpretation

- Interpretation of control-handling injuries is extremely dependent on:
  - Knowledge and experience of the pathologist
  - Knowledge of flight procedures
  - Understanding of aircrew behavior
  - Correlation with radio communications and recorded inflight data
  - Correlation of eyewitness and survivor accounts
  - Accurate identification and site mapping
  - Correlation with other autopsy findings